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A Pilot Study: The Effect of Singing and Non-Singing — Instructional Strategies on Harmonic Listening Skills

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A shared understanding among many music educators is that the ability to sing musical structures (scales, intervals, chords) informs the ability to sight sing and to take dictation. To date, however, there is little or no research that systematically investigates whether or not singing experiences help students to acquire harmonic listening skills. Chittum (1969) observed that one can rarely recognize what one cannot produce. By extension, Chittum hypothesized that reproducing harmonies with one's voice—by singing chord arpeggios—prepares one to take harmonic dictation: students who learn to sing chord arpeggios develop more easily the ability to take harmonic dictation. Chittum asserted that students should only begin to engage in written harmonic dictation after they are successful in reproducing arpeggios with their own voices.

Furthermore, Chittum suggested that the most common method of harmonic dictation taught in many colleges and universities is not harmonic dictation, but rather, melodic dictation of the bass and soprano lines followed by analysis to determine a chord's identity. Karpinski referred to this method as *harmonic looking*, rather than *harmonic listening* (Karpinski, 2000, p. 118). Chittum asserted that most theory professors know that this methodology—parallel melodic dictation of the outer voices—is ineffective, but hypothesized that this approach persists because the prior musical experiences of most students is of performing a single-line instrument, such as a clarinet, rather than a chordal instrument like the piano. However, Chittum provided no empirical data to support his hypothesis about the relationship between singing and harmonic listening skills.

Informed by research in the areas of music psychology and cognition, music education, music theory and music perception, Karpinski's *Aural Skills Acquisition* (2000) contained effective advice on how to advance one's abilities in many of the tasks associated with aural skills. One stark exception is harmonic dictation. Rather than providing proven pedagogical methodologies, as he does for other aural skills, Karpinski critiqued common methodologies; he highlighted weaknesses without endorsing one approach more than another, or providing a viable alternative (Karpinski, 2000, pp. 117-127). Much of the discussion about harmonic dictation falls into the category of thinking *about* music, instead of thinking *in* music, which contradicts Karpinski's goal that "[t]he book is about thinking *in* music" (Karpinski, 2000, p. 4).

Karpinski evaluated singing chord arpeggios, as recommended by Chittum, as being "tedious and detail-oriented," in part, because each chord must be learned in multiple inversions (Karpinski, 2000, p. 119). Even though Karpinski included a research study by Manuel Alvarez (1980) in his reference list, Karpinski did not review Alvarez's method of identifying harmonies via a scalar technique, for which listening focuses on hearing $\hat{1}$ or $\hat{7}$ within a harmony as the first step to identifying an entire chord. Working with 72 seventh and eighth grades, Alvarez taught the scalar technique to some and a more traditional approach of identifying root movement between harmonies to others.

Alvarez's experiments (1980) investigated three basic questions:

1. Is a scalar or root harmonic aural perception technique more effective in teaching seventh and eighth-grade general music students to identify primary harmonic functions?
2. Are differences between the effects of instruction associated with tonal aptitude levels?
3. Do methods of instruction affect performances on different criterion measures of primary harmonic functions?

Alvarez found that students who learned the scalar technique performed better in all four areas tested: tonal aptitude, tonal inaptitude, the root test, and the root/inversion test.

Even though Alvarez's research did not mention singing as a methodology to acquire harmonic listening skills, it did endorse the scalar method as an effective pedagogical approach to develop harmonic listening skills—a pedagogical approach more successful than the commonly taught root technique that directs listening to the bass line. This allowed Alvarez to deduce that what makes sense with respect to knowledge of music theory does not translate to the skills of aural perception. The purpose of this investigation is to examine the effects of singing and non-singing experiences when students develop harmonic listening skills.

Method

Participants were children and adolescents who participate in a community youth choir ($N=21$). Ages ranged from 9-16 years. The subjects were organized into four separate groups. All subjects attended four consecutive days of classes and each class was 45 minutes in duration. All data were collected during the summer months of July and

August 2012. All of the students who participated in the community choir had previous experience with solfège syllables and hand signs; thereby, the instructor of the study used solfège and hand signs as pedagogical tools. Though the curriculum for all four groups was identical, two were designated as singing groups and two as non-singing. With the singing groups, the instructor modeled singing solfège, and led subjects to sing. Subjects in the non-singing groups received only spoken instruction; though most musical structures were played on the piano while the solfège was chanted. These subjects did not sing.

Classes on Day One began with all of the subjects completing a one-page survey, to collect demographic data and information regarding previous music experience (Appendix A). A pre-test post-test design assessed the students' listening skills. Each test contained four units, though question order within each unit was varied for each test (to address validity).

1. Unit one included five questions asking subjects to discern if the audio excerpt featured a single pitch or more than one pitch.
2. The remaining units all presented three questions, each with two audio excerpts. Subjects were asked to evaluate if the two excerpts were the same or different.
3. Excerpts in unit two contained melodies, while excerpts in the remaining units featured chorale-style chord progressions.
4. Excerpts in unit three varied the outer voices without changing the chords, while excerpts in unit four varied the harmonies without changing the outer voices.

On Day One the instructor described how to build triads, using the formula notated in Figure 1. Singing subjects sang the formula, whereas non-singing subjects spoke it. Both groups marked solfège ladders, as shown in Figure 2, while reciting the formula. The procedure was repeated until every syllable had served as the root of a triad, which was used to identify chords. The tonic chord was referred to as the Do-chord; dominant the So-chord; subdominant the Fa-chord; and submediant the La-chord. Initially, only the three primary triads were memorized.

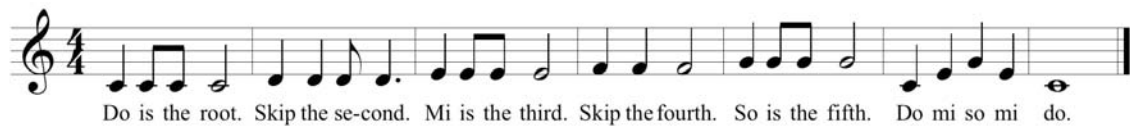


Figure 1. Formula used to build triads.

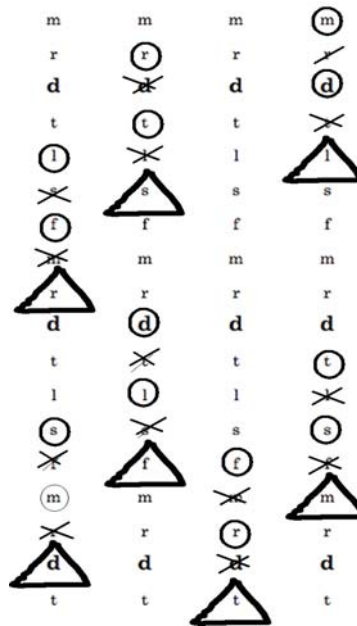


Figure 2. Solfège ladders used to build triads. Triangles are drawn around the chord root, and circles around the third and fifth.

Solfège symbols for the three primary chords were displayed on the board, all in root position. Students were asked to analyze the solfège content of each triad and to identify the common tone between the Do- and Fa-chords, and between the Do- and So-chords, indicated by the dotted lines on Figure 3.

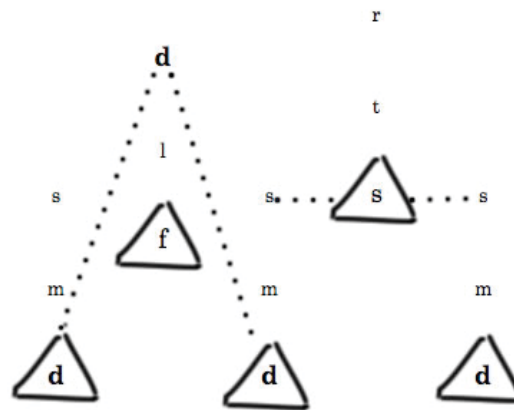


Figure 3. Dotted lines connect common tones.

Chords were re-written placing common tones adjacent to one another in a horizontal line, prompting the instructor to define the terms *root position*, *first inversion* and *second inversion*. Instruction on Day One ended by singing the Do-chord, Fa-chord, and So-chord in Do-Ti inversions (see Figure 4).

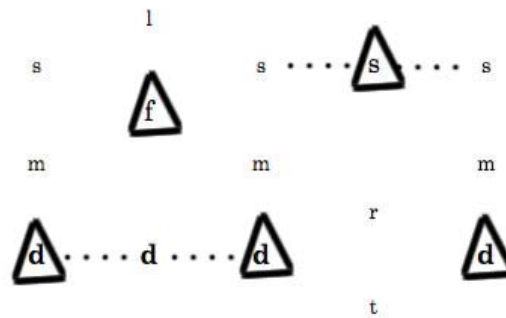


Figure 4. Solfège rearranged to place common tones in a row.

Goals for Day Two are listed below:

1. To memorize the Do-Ti inversions for the three primary triads.
2. To distinguish the distinct sound of each primary triad.
3. To learn how primary chords progress in common-practice music.
4. To listen and identify the highest and lowest pitch in a triad.

Memorizing the three primary triads in Do-Ti inversion was achieved via repetition as subjects viewed the syllables. Thirds and fifths were erased from the board to reinforce internalization.

Learning to discern the aural differences among the three primary triads was a significant purpose of this research; consequently, subjects were instructed to listen for the presence or absence of Do.

1. If Do was present, then the harmony was either a Do-chord or Fa-chord.
2. If Do was not present, then the harmony was a So-chord.

To learn how chords progress in common practice music, subjects in the singing group sang the song notated in Figure 5 while also tracing a diagram shown in Figure 6. Subjects in the non-singing group followed the same procedure, while speaking the lyrics.

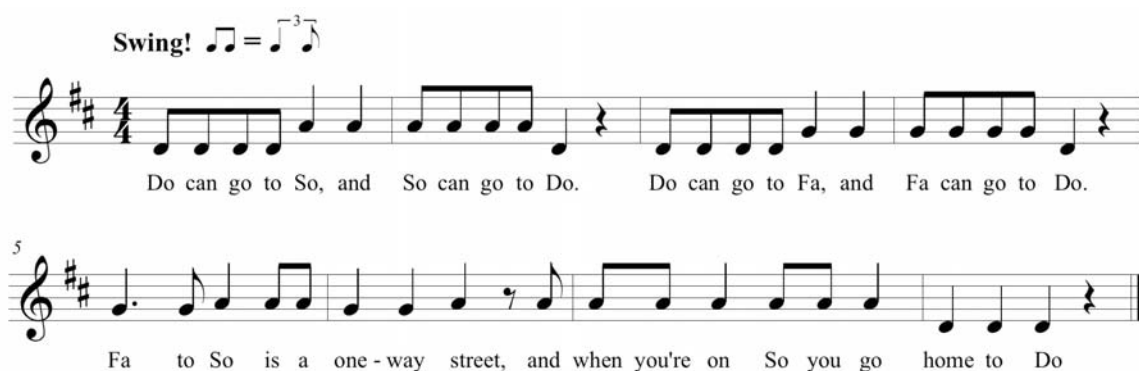


Figure 5. Text used to learn how chords could progress from one to another. Solfège syllables are the chord roots and represent the entire chord.

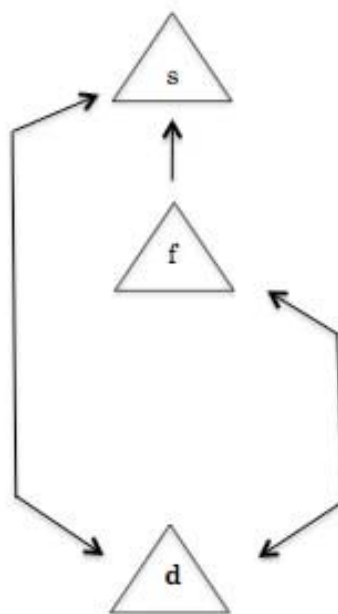


Figure 6. Diagram used to depict the song in Figure 5.

The penultimate activity on Day Two combined two skills: (1) identifying a chord via Do-Ti, and (2) knowing allowable chord progressions. Day Two concluded with instructing subjects to evaluate the lowest and highest pitches in a block-chord texture:

Day Three began with a review of the two previous classes then focused on hearing the submediant La-chord. Students practiced harmonic listening skills:

1. Analyze the Do-Ti thread in the music
2. Determine the chord root
3. Evaluate the highest and lowest pitches in each triad.

Day Four concluded with subjects taking harmonic dictation, as well as the post-test. The instructor also modeled, for both groups, how to sing chord arpeggios with a pop musical excerpt and a classical excerpt.

Results

Figure 7 presents the pre-test post-test data for all subjects, comparing the non-singing groups to the singing groups. As a whole, the non-singing groups scored higher on the pre-test than the singing groups. This difference reflects that subjects were grouped according to availability to participate in the research project during the summer months, not by the results of a diagnostic test that could have created similarly skilled groups. Regardless, it is important to note that the singing groups increase their post-test scores in all four units of question types.

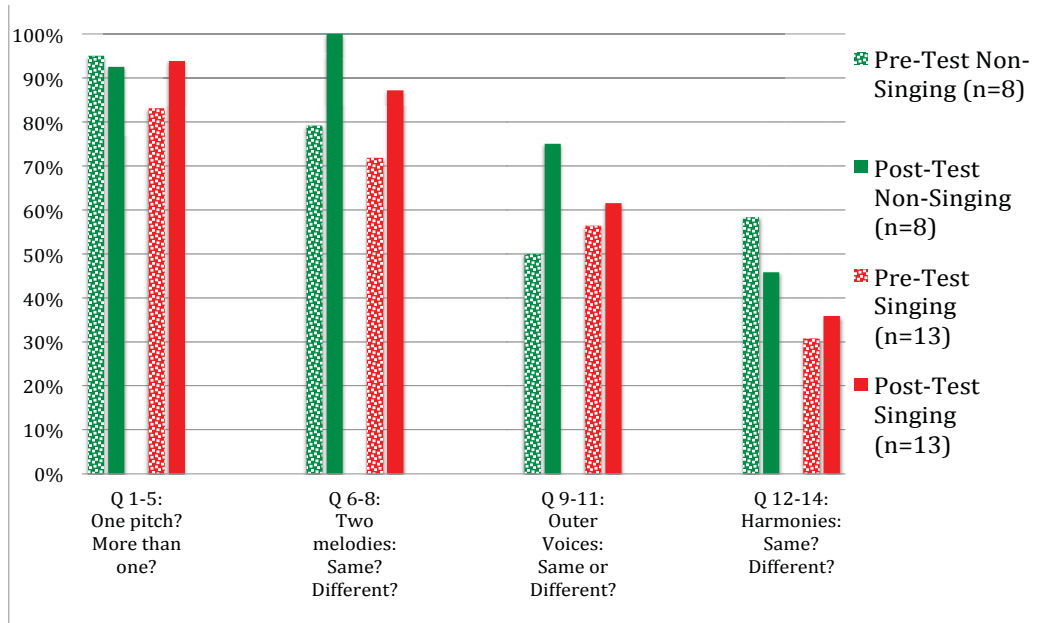


Figure 7. Pre-test, post-test results for non-singing and singing groups (organized by question groups).

Figure 8 displays the percent increase between the pre-test and post-test for both the non-singing and singing groups by comparing the average scores and the median scores. Whether calculating the increase of the average or the median, the singing groups scored higher than the non-singing groups. This is particularly true of median scores. The non-singing groups increase only 3.6%, whereas the singing groups increase 14.3%.

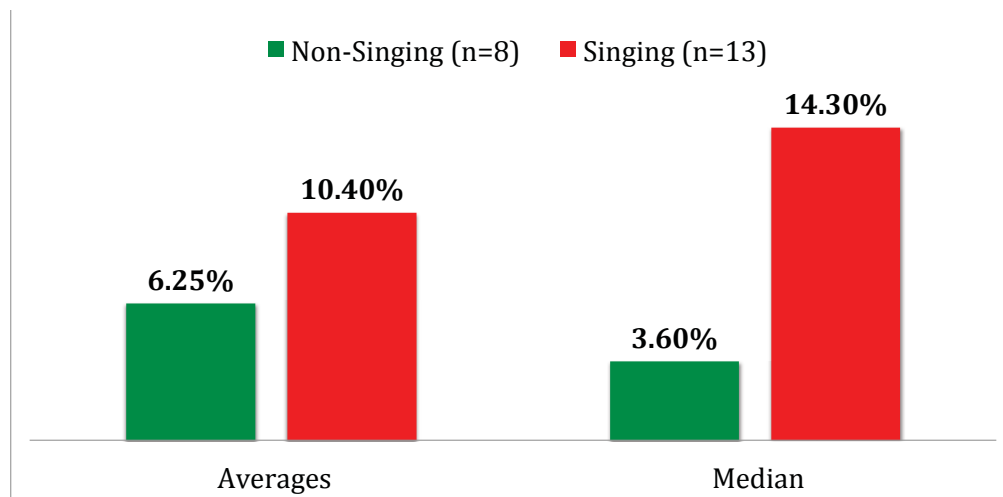


Figure 8. Percent increase in average and median scores between the pre-test and post-test.

Figure 9 compares the ability of the two groups to identify the chords in a progression. The singing groups scored higher than the non-singing groups, whether the progression is short and simple (I-IV-V-I) or long and complex (I-V-I-vi-IV-V-I). The difference between the groups is 18.3% with the former progression and 10.5% with the latter.

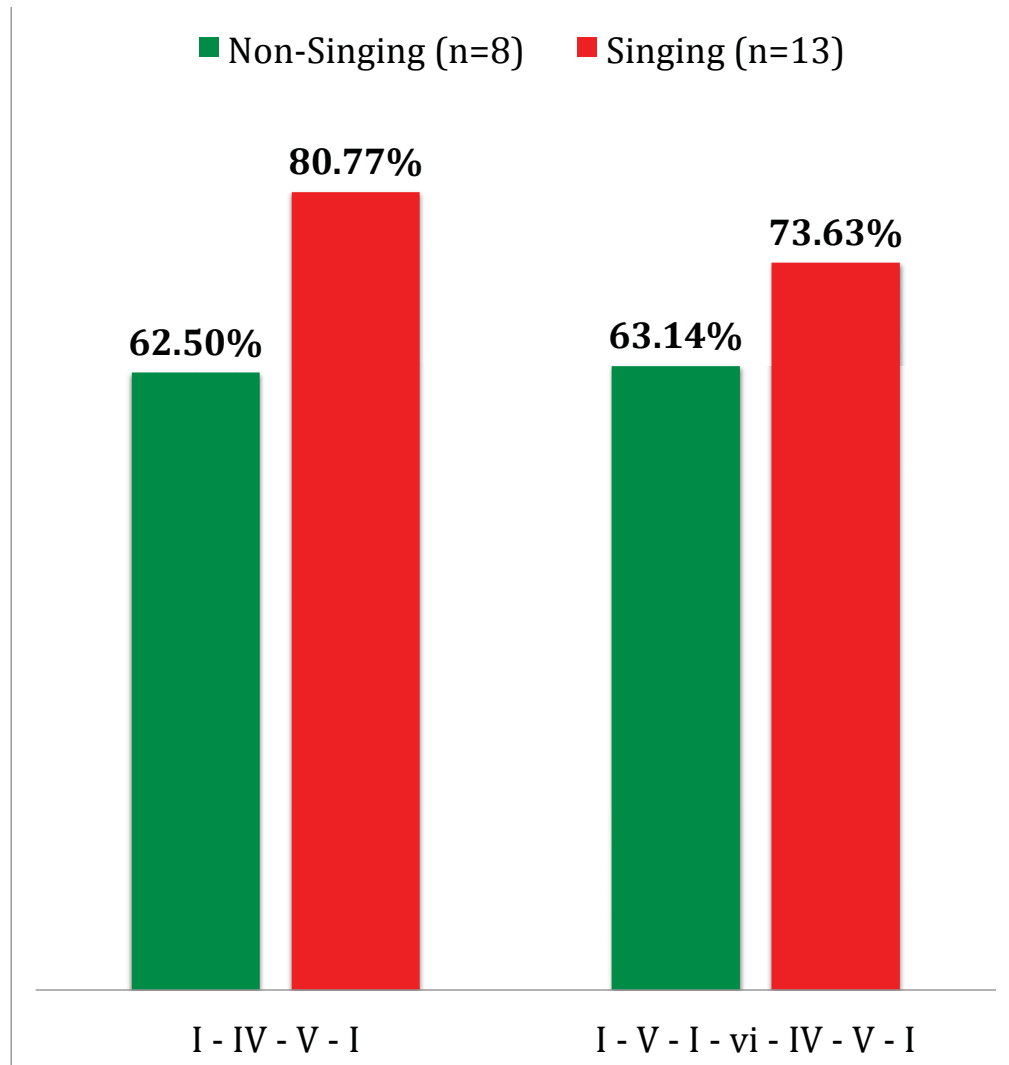


Figure 9. Comparison of non-singing and singing groups' abilities to identify harmonies in two chord progressions.

Figure 10 examines the success rate each group had for hearing the specific harmonies within both progressions: I, V, IV, and vi. More than three-quarters of the singing groups successfully identified I and V, whereas less than two-thirds of the non-singing groups recognized tonic and less than the half the dominant. A significant difference occurred between the two groups'

abilities to identify IV. The subdominant and the submediant occurred only once in each progression; thereby, the data for these harmonies is less reliable.

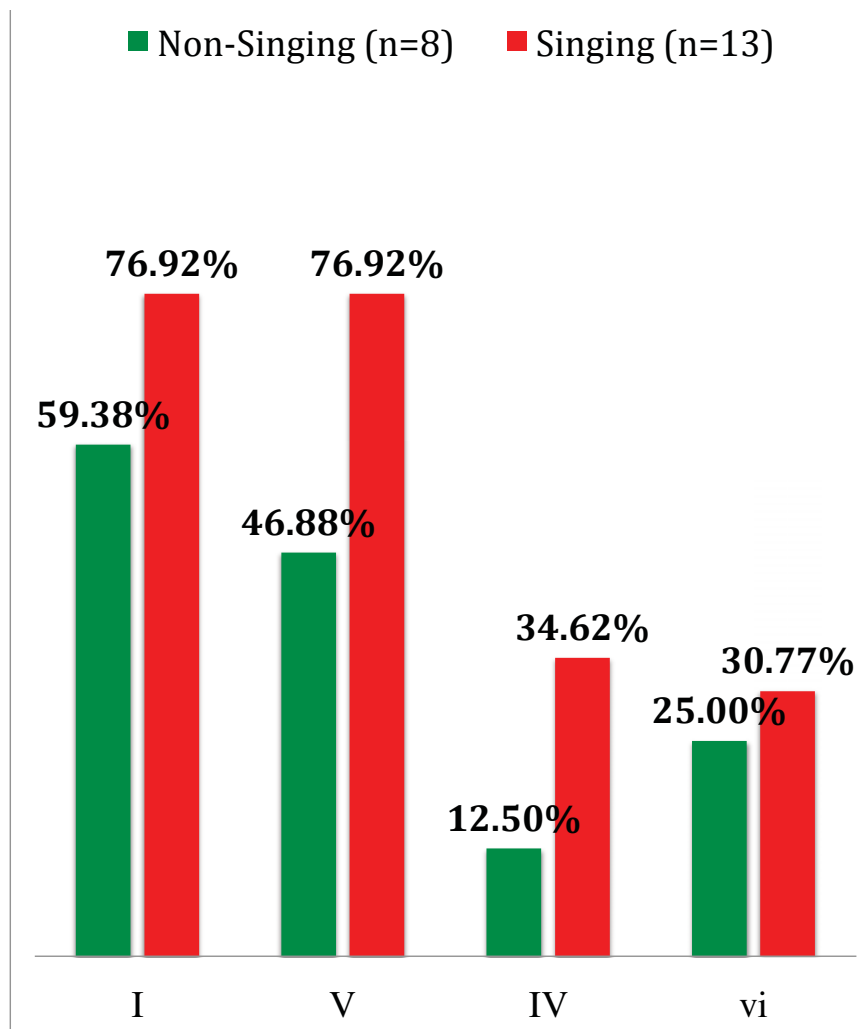


Figure 10. Comparison of non-singing and singing groups' abilities to identify I, V, IV, and vi chords.

Discussion

Aural skills instructors use a variety of strategies to teach harmonic dictation. At the college level, harmonic dictation is often practiced by notating the outer voice—first the bass, then the soprano. Given two voices, students deduce the identity of the chord. Karpinski's (2000) refers to this process as “harmonic looking,” implying the harmonic dictation would involve identifying the chords first. Currently, little research exists that investigates whether or not singing experiences help students to acquire harmonic listening skills. Since universities across

the country require music students to master harmonic dictation skills as a component of their music theory curriculum, the researchers identified a need for research.

The instructional strategies used in this pilot study focused on learning to sing chord arpeggios in Do-Ti inversions within a tonal context to help identify harmonies when taking harmonic dictation. Mean scores for those students who received singing instructional strategies, and participated in singing experiences, were higher than the scores of those who did not receive singing instruction or sing themselves. Results from this pilot study were consistent with Chittum's (1969) conclusions that students who learn to sing chord arpeggios are more successful when asked to take harmonic dictation.

Even though the sample size was small, researchers have a reasonable expectation that these data suggest singing experiences are beneficial to students' harmonic listening skills. In order to make this study more comprehensive, the researchers intend to explore the differences of singing and non-singing instruction for other populations. As they further investigate the differences between using singing and non singing instructional and experiential activities, the researchers plan to test public school students in middle school students and high school. In addition, freshman university music majors will be tested.

Because this was a pilot study and the subjects were limited to members of a community youth choir, the researchers identified several components of the study that will help refine the process of taking data and more reliable data. Test subjects in this study relied upon parental support and one subject's data had to be taken out of the final results because the student's parents arrived very late on Day Four, during the post test. Parental approval will also be necessary in future studies with middle school and high school aged students, but the subjects will be in a public school setting. Also, larger groups of students will be tested for each age group.

Furthermore, subjects for this study needed to be grouped according to when parents indicated they could bring them to the classes. In the future, the researchers will group subjects of selected populations according to results of a diagnostic pre-test. Even so, the singing groups' post-test scores were greater in all four units of question types. Caution should be used when making generalizations about this study's findings because of the small sample size and challenges with dividing the students into the singing and non-singing groups. Still, the researchers agree that this study provides incentive to continue studying the differences between singing instructional strategies and experiences and non-singing instructional strategies and experiences when teaching harmonic listening skills.

References

- Alvarez, M. (1980). A comparison of scalar and root harmonic aural perception techniques. *Journal of Research in Music Education*, 28(4), 229-335.
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Appendix A

The Demographic Survey

Survey of Prior Musical Experiences

ID: _____

How old are you? _____

How long have you been in the Hill Country Youth Chorus?

Does your home have a piano? Yes or No

Do you take piano lessons? Yes or No

If so, how many years? _____

How often does your family sing together? (circle one)

Daily Weekly Monthly Yearly Never

What other musical experiences have you had?

Private Voice Lessons No Yes How long? _____

Musical Theatre No Yes How long? _____

Dance No Yes How long? _____

Band/Orchestra No Yes How long? _____

School Choir No Yes How long? _____

Church Choir No Yes How long? _____